Lightning protection scenarios of communication tower sites; human hazards and equipment damage

ABSTRACT

This paper provides comprehensive analysis on the lightning protection scenarios in 48 communication and broadcasting towers situated in similar isokeraunic contours in Sri Lanka at 79°ï 81° East and 5°ï 10° North. The investigation has been conducted to study the hazardous environment created on the tower and in the neighbourhood in the event of a lightning strike to the tower. The results show that a direct strike to an antenna structure in a metallic tower is rare irrespective of the presence of an air-termination or a down conductor. However, side flashing or arcing to antenna structures is highly possible once the air-termination and/or down conductor is installed and attempts are made to insulate the system from the tower. The outcome also shows that equipotential bonding of the grounding system, a distributed grounding network including a ring conductor and a suitable system of surge protective devices play a much vital role in lightning protection of equipment and safety of people compared to the effects of simply achieving a low grounding resistance. However, in the absence of such integrated, distributed and equipotentialized grounding system, a high value of ground resistance will sharply increase the possibility of accidents and damage. Considering the observations of the investigations into account we have designed a concrete embedded grounding system for tower sites at problematic locations. Finally, the scenarios for safety management at telecommunication tower sites have been discussed.

Keyword: Lightning; Protection; Safety; Communication; Tower; Guidelines; Grounding